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Smallholder pig production and marketing value chain in Uganda: Background proposals for the CGIAR Research Program on Livestock and Fish

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International Livestock Research Institute

P O Box 30709, Nairobi 00100, Kenya
Phone + 254 20 422 3000
Email ILRI-Kenya@cgiar.org

P O Box 5689, Addis Ababa, Ethiopia
Phone + 251 11 617 2000
Email ILRI-Ethiopia@cgiar.org

www.ilri.org

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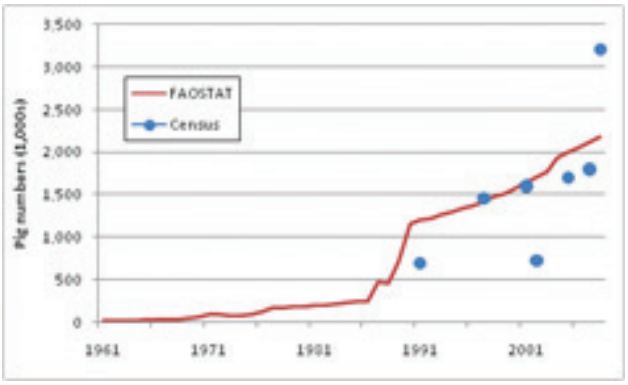
According to recent FAO statistics, pork is second only to beef in terms of meat production in Uganda (see Table below). Since imports and exports of meat products are negligible, this ranking also reflects the relative importance currently of pork in terms of meat consumption.

Meat production in Uganda

Type	Amount 1,000 (tonnes)
Beef	96.8
Pigmeat	77.4
Chicken meat	44.1
Goat meat	24.6
Sheep meat	5.3

Source: FAOSTAT | © FAO Statistics Division 2010 | 14 September 2010

Pork has only become important in Uganda over the past two decades; pig numbers have grown rapidly following the Idi Amin years as pig keeping has become an increasingly common strategy for rural households and pork has become a popular food in the 'pork joints' of Kampala and other towns. Whereas pork accounted for only 1–2% of the 11–12 kg/year per capita meat consumption in the 1960s, it now accounts for at least a third of the current 10 kg/year (FAOSTAT). The recent livestock sample-based census conducted in 2008 recorded 3.2 million pigs, a remarkable doubling of the numbers from recent years and much higher than those reported in FAOSTAT.



Pig numbers in Uganda, 1961–2008
Source: FAOSTAT | © FAO Statistics Division 2010 | 14 September 2010; MAAIF/UBOS (2009)

Little information is available regarding the structure and composition of the pig sector in Uganda. According to key informants, the majority of pigs are kept by smallholder households under extensive systems (an earlier estimate cites 80%); Lekule and Kyvsgaard (2003) with small numbers of peri-urban small-scale, semi-intensive farms and a few larger modern, intensive farms producing for commercial sale. The 2008 Livestock Census reports 1.1 million households, or 17% of all households, keep pigs (on average 2 pigs).

The typical smallholder pig system is free-range or tethered with little or no housing (Waiswa 2005). Animals are apparently the survivors from introductions during the 1960s and of no distinct breed. Village herds are possibly inbred. In addition to what the pigs scavenge, they are provided with household scraps and bran. During the crop growing season, pigs are often tethered to avoid crop damage. They are kept for sale and only rarely slaughtered for household consumption (Ampaire and Rothschild 2010). Households like the fact that they require few, if any, inputs and yet generate a significant amount of income when sold. Poorly organized markets and disease risk, especially of African Swine Fever (ASF) (Costard et al. 2009) are credited with discouraging intensification of production. Pigs serve no other cultural or livelihood roles besides being a productive asset that can be sold when needed. Gifting of piglets is reportedly a popular strategy for politicians, the government and NGOs.

Pigs from village systems are usually sold directly to butchers or through middlemen for slaughter in local informal systems. Pigs are among the most important live-animal commodities that farmers produce for sale (Nyapendi et al. 2004).

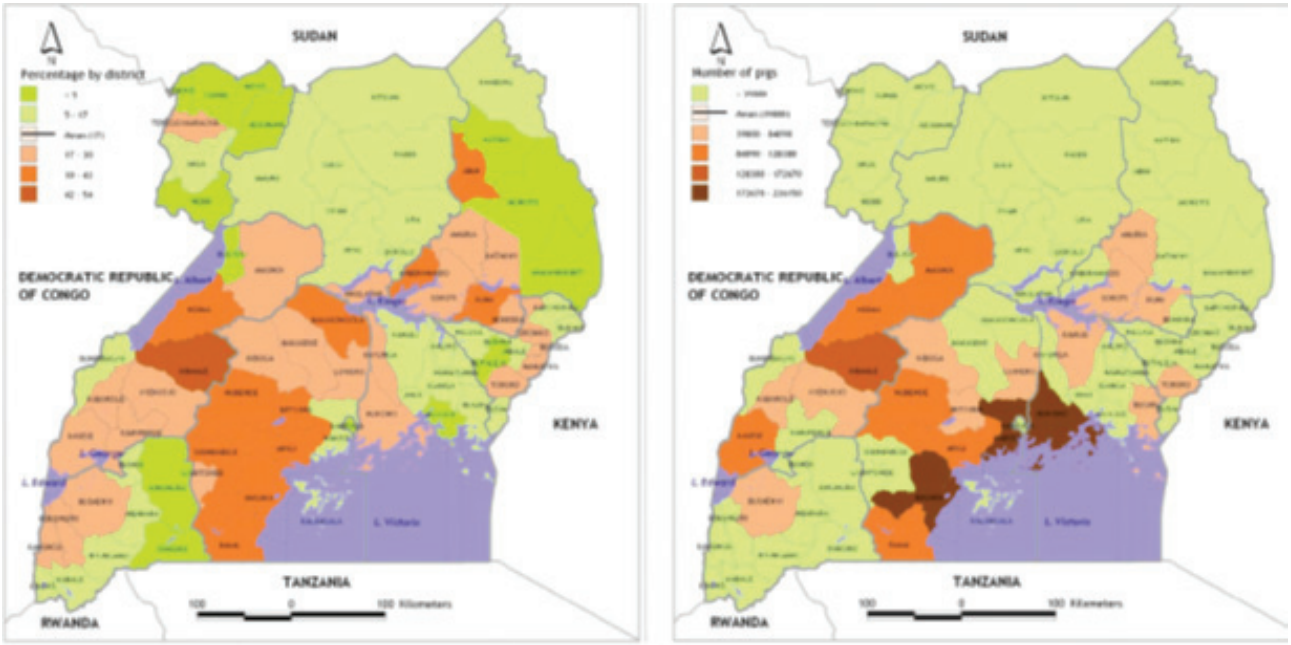
Peri-urban small-scale producers keep larger herds under managed production cycles for commercial sale. Basic housing and locally produced feeds are typically used (Muwonge et al. 2010). Management practices vary depending on the degree of specialization of the farmer. Farmers market their pigs to local butchers, ‘pork joints’ or other restaurants.

Concurrent with the increase in smallholder pig keeping and pork consumption, porcine cysticercosis (Phiri et al. 2003; Waiswa 2005; Waiswa et al. 2009), and prevalence of mycobacterial infections (Muwonge et al. 2010) have been increasingly reported from eastern Africa.

A small number of modern piggeries have been established as development or business investments, usually located near Kampala. These farms have often faced difficulty covering their costs and competing successfully with cheaper sources of pork, and face the risk of ASF outbreaks that can decimate their herds. Since these farms are associated with better quality control, they supply the formal sector, which includes commercial butcheries, larger restaurants and hotels, and the small processing sector that has been developing.

Inputs and services supporting pig production are largely informal Few commercial feed products are available specifically for pig production, there is no commercial breeding service, and availability of veterinary care and extension advice to smallholder systems is very limited. There is, however, unorganized development of small enterprises and services providing locally made feed products and other inputs. Credit services for pig production are generally unavailable to smallholders outside of localized project schemes. Market systems are largely informal with little devoted infrastructure. Overall productivity in terms of feed conversion, reproductive rates and offtake remains low.

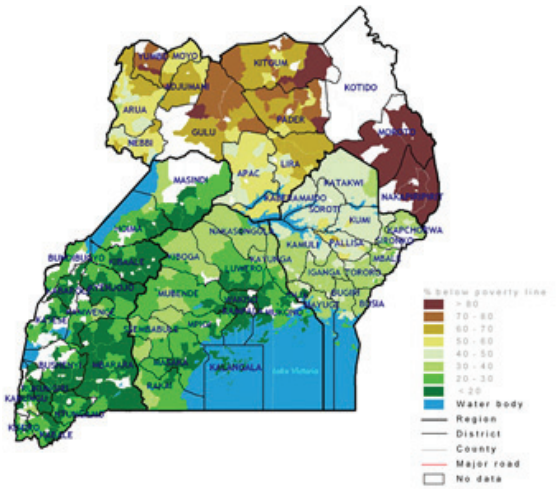
As indicated in the following Figure, pig keeping is practised across all of Uganda, with concentrations around Kampala in districts along Lake Victoria and in the zone between Lakes Victoria and Albert, with another zone of lower concentration to the east in the Soroti-Mbali area (circled in the second map). The maps, below, show the distribution of the incidence of poverty within Uganda, and suggests that pig-keeping in the Soroti-Mbali area would have particular benefits for poverty reduction.



Percentage of households keeping pigs (on left) and numbers of pigs, by District in 2008 (on right)
Source: Uganda Livestock Census (2008)

Why this value chain?

Pork is generally a minor component of diets in Africa, and pigs do not figure prominently in farming systems across the continent (Tacher et al. 2000). This can be attributed to cultural reasons—both due to a lack of tradition of pig-keeping and the influence of Islam—as well as to production constraints, especially the continued threat of ASF. Despite these constraints, pig keeping has become established in many areas and its popularity as a quick turn-around, lucrative 'cash crop' among livestock activities and as a less expensive meat for urban diets continues to grow, offering substantial opportunities for income generation (Nkonya et al. 2002; Nyapendi et al. 2004). Given the evidence of its growth potential and the competitiveness of small-scale production and marketing systems in sub-Saharan Africa, it was considered appropriate to include a pig value chain in sub-Saharan Africa as a target for CRP 3.7 efforts. It is also considered important to provide a means for comparison and cross-learning with the pig value chain selected for South East Asia in Vietnam; smallholder production and marketing systems there are highly sophisticated and may provide valuable models.



Incidence of poverty in Uganda in 2002, by county
Source: Uganda Bureau of Statistics, accessed at: http://www.ugandaclusters.ug/PVRTY-INQLTY/map2.html

The following Table shows the top five sub-Saharan African countries according to size of pig population. Of these, Uganda has high production and consumption per capita, and appears to be experiencing the most rapid growth. For this reason, and given other factors related to the high poverty rates, existing momentum and enabling environment as described in the ensuing Table, we selected Uganda as the priority pig value chain for Africa; it is judged to offer the highest probability of demonstrating the pro-poor potential of smallholder pig production and marketing chains in sub-Saharan Africa. Households may particularly benefit from linkages to markets with regard to increasing household incomes, and accumulating assets (Kaaria et al. 2008).

Pig sector indicators in five sub-Saharan African countries with the highest pig populations, 2007

Country	Number of pigs (million head)	Pig meat production (1,000 t)	Pig meat consumption (kg/person/year)
Nigeria	6.6	209	1.4
Burkina Faso	2.8	40	2.7
Uganda	2.1	105	3.4
South Africa	1.7	174	3.5
Cameroon	1.4	18	1.0

FAOSTAT | © FAO Statistics Division 2010 | 14 September 2010

Criteria and rationale for choosing Uganda

Criteria	Rationale for choosing Uganda
Growth and market opportunity	Rapidly increasing production and consumption of pork within the country, driven not only by population growth, but also by a combination of rising incomes and changing preferences associated with urbanization and changing production systems Growing demand for processed products as street food and for supermarkets, and emergence of formal-sector enterprises (e.g. Fresh Cuts, Quality Cuts, My Choice) Growing base of smallholder producers with potential for intensification
Pro-poor potential	Growing popularity of pig keeping among smallholder households (17% of all households currently keeping pigs), with potential for intensification Smallholder sector appears to remain more competitive than modern piggeries Pig keeping in smallholder systems is largely considered a woman's activity Many market agents along the value chain (input/livestock traders, meat processors and transporters etc.) provide potential for increased income and employment from adding value Pork increasing in popularity as a low cost street food and as a meat product sold in informal markets, and as a share of the national diet
Researchable supply constraints	Control strategies for ASF, which remains the single largest risk to production Other swine health issues (high piglet mortality, Classical Swine Fever (CSF), worm infestations) Public health concerns regarding cysticercosis Poor feeding practices and lack of adequate supplies of appropriate feeds, either on-farm or purchased Lack of knowledge for better use of by-products (e.g. brewer's yeast) Limited genetic resource base and inbreeding Poor biosecurity, with breeding practices contributing to disease transmission Lack of awareness and incentive to adopt improved management, esp. housing Lack of sustainable organizational structures for breeder and producer groups in order to facilitate their access to affordable breeding animals, animal health care and efficient market services Poor or non-existent waste management systems Lack of business and management decision support tools, e.g. when it is better to specialize in breeding, weaner or fattening operations; optimal feeding strategies for profits, business plans for infrastructure investment Poor market infrastructure and institutional arrangements (underdeveloped marketing system) resulting in high price difference between rural and urban markets, high number of middlemen and thus small producer margins Weak input supply system and limited support services (extension and credit systems) Ineffective knowledge management systems, in particular knowledge sharing between producers and scientists, to enhance uptake of proven technologies

Criteria	Rationale for choosing Uganda
Enabling environment	Though not identified as a priority for commercial development investment (e.g. DSIP, NLPIP), generally appreciated by policymakers as a high potential opportunity for broad-based food security and income diversification in rural areas Numerous past and current smaller-scale development efforts targeting smallholder pig development: Danida, Heifer Project International (HPI), Volunteer Efforts for Development Concerns (VEDCO), National Agricultural Advisory and Development Services (NAADS) Favourable business climate and policies for micro, small and medium-enterprise development
Existing momentum	CRP 3.7 is also proposing to focus its work on the aquaculture value chain in Uganda ILRI has long-standing collaboration with both the Ministry (MAAIF) and Makerere University, particularly on poverty mapping and trypanosomosis, East Coast fever, and other animal health research CIAT has on-going collaboration with NARO on forage research ILRI and ICRAF are heavily involved in supporting the implementation of the East Africa Dairy Development project activities in Uganda, particularly with respect to improving feeds and their use ILRI and ICRAF are collaborating with the BMGF-funded project on sweet potatoes (SASHA), which is promoting food–feed applications that would suit smallholder pig systems ILRI has other on-going research activities in Uganda: characterization of Ankole cattle with BOKU (Austria) and Makerere University; characterization of ASF with SLU (Sweden) and Makerere University Several other CGIAR centres are active and have staff based in Uganda Very few other global organizations combine development with innovative and adaptive research

Research and supporting actions

As seen in the earlier maps, the emergence of pig keeping in Uganda is a recent phenomenon and, as a result, there has been little systematic research on pig production and marketing systems. Both the national agricultural research system, NARO, and Makerere University currently maintain modest programs of research in these areas (NAADS 2010). Constraints to improving the productivity and performance of smallholder pig production and marketing systems in Uganda are, therefore, not well characterized, and no attempt has been made to assess their relative importance. Perceived constraints were, hence, identified by stakeholders during consultations in Entebbe and Kampala in September 2010, and are summarized in Table below.

Opportunities and constraints in the pork value chain in Uganda and the research and development actions to overcome them

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Inputs and services	How to organize efficient, viable, and equitable input services for smallholders? Management training Feed provision Health care Breeding Credit Market information How to strengthen innovation capacity of input and service value chain actor webs? What strategies can be devised to ensure equal access to inputs and services by women, as well as inputs and services tailored to women farmer's needs? Are there collective action strategies for organizing farmers and other actors in the value chain to benefit from economies of scale in purchasing inputs and services?	Researchable issues How can input and service delivery systems be organized to better perform to increase productivity and efficiency in a gender-equitable and pro-poor manner? Differences in men's and women's and poor and rich households' access to inputs, preference for inputs, use of inputs, roles in input supply. What methods can be used to stimulate innovation systems within input and service value chains?	Research NARO NaLIRRI Makerere University Supporting actions, in particular organizing input delivery: NGOs and CBOs: VEDCO, Oxfam Private or governmental animal health services Seed companies Feed enterprises Micro-credit schemes	Increased use of inputs and services, which are accessible and delivered in time to male and female smallholders Increased knowledge of male and female smallholders about useful inputs and services Functional institutions and conducive policy environment

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
		Supporting actions Assess the policy and business environment for input and service value chains Assess the structure, actor incentives, and performance of each major input and service value chain and identify opportunities for upgrading, improving access by and for women, and improving benefits to the poor current institutions and policies Current access and frequency of use Constraints to access Design and pilot improved systems as candidates for large-scale development intervention Improved commercial feed formulations using local materials BDS approaches for small-scale mixing and feed marketing appropriate to smallholders Improved selection and seed systems for dual purpose food–feed crops Novel dissemination strategies for technical advice and market information		

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Production	How do we increase pig meat production and herd productivity to meet current and future market needs? How to design appropriate breeding strategies, avoiding inbreeding and negative selection of boars? How to overcome seasonal or continuous gaps in feed quantity and quality? Which healthcare strategies are essential to increase productivity? How do we enhance farmer and actor uptake of productivity-enhancing technologies and strategies?	Researchable issues What basic husbandry practices and housing that significantly improves productivity can be reasonably afforded and taken up by farmers? What are the genetic attributes of breeds currently in use; can breeding programs improve their quality or is it appropriate to introduce new breeds or cross-breeding programs better suited to existing and emerging production systems and environment? How can ASF be better managed to reduce the risk of catastrophic losses? How can farm biosecurity be strengthened? What is the relative importance (disease burden) of the range of health problems affecting pig production and how can priority diseases be better managed? How can robust and profitable feed formulations and processing technologies be designed that best take advantage of on-farm resources supplemented by purchased feeds? Are there differences among men's and women's motivation to engage in the enterprise, in anticipated benefits, roles in production, skills/capacity needs, sources of knowledge/technology, influence of policies and institutions? Are recommended practices and technologies suitable for women or socially discouraged? How will resource requirements for improved pig systems compete with other uses for household livelihoods Can pig waste be better utilized or managed?	Research NARO ; NaLIRRI Makerere University BOKU-Vienna Supporting Actions MAAIF NGOs: VEDCO; Heifer Project International; Oxfam Danida	Access to breeding boars with higher breeding value Decreased inbreeding index Herds more homogenous in desirable traits Improved market weight and body condition Reduced mortality Increased offtake rate

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
		Supporting actions Design and implement breeding programs, incl. selection strategies to enable sustained genetic improvement in key breeding objective traits while minimizing inbreeding and its effects at herd and at population level Create economies of scale by developing and facilitating organizational arrangements through farmer group approaches and collective action Optimize animal health and disease control, through Identifying priority diseases Improved ASF management strategies Promoting simple housing and preventive measures such as access to adequate feed and clean water Devise inexpensive anthelmintic strategies Optimize feeding systems and increase feed resources, in particular Testing forages varieties including food–feed varieties and integrate them into cropping systems Optimizing use of currently available feed resources, (strategic supplementation, feed preservation, purchase of most limiting nutrients) Promoting feed processing options (simple hand chopping; village based motor-driven choppers; commercial but decentralized feed processing units)		

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Transport and processing	How to deliver reliable quantities of safer products (meat or live animals) from smallholder systems to meet preferences for lean in urban areas and fat in rural ones? How to increase efficiency through collective action to achieve economies of scale? How to reduce waste? How to increase women's participation in the post-harvest supply chain? How to enhance equitable distribution of value added among actors within the value chain?	Researchable issues Is a carcass grading system required and what would be an appropriate grading and pricing system? Does the market prefer/segregate carcass parts or cuts and if so, how can this be mainstreamed in the breeding strategy and pricing system? How to reduce boar taint? Is there any difference in quality of products supplied by men and women? Are there differences in access to transport and processing services? Can trade services be improved through basic management skills?	Research NARO Uganda Industrial Research Institute Makerere University Supporting actions MAAIF NGOs: Heifer Project International Private processing companies: Fresh Cuts; Quality Cuts; My Choice Butchers	Meat quality criteria defined with traders and consumers Higher quality carcasses produced Higher prices and incomes for pig producers Higher employment and incomes for traders and processers

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
		Supporting actions Disseminate weighing band calibrated for local pigs to help establish appropriate prices Establish grading/quality systems for carcasses if appropriate Apply participatory risk analysis for developing appropriate local standards for pork safety Apply BDS approaches for stimulating small-scale businesses for transport and processing services Raise awareness and develop diagnostic aids for detecting cysticercosis-infected animals and meat Develop certification schemes for safe handling of meat products Capacity building on transport, handling and slaughter of pigs with all involved stakeholders Design of traceability system for pig meat (longer term)		

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Marketing	How to organize markets (both demand and supply) for equitable benefits along the chain? How to ensure access for low-income Ugandans to safe meat at an affordable price?	Researchable issues Market/Consumer demands: what do markets pay for (breed, region, specific live weight or size, quality)? Market structures: relations/transactions between local and urban; potential for regional trade Market access: is it preferable to organize the farmers for accessing markets or to improve marketing systems and infrastructure (e.g. infrastructure of markets)? Market transparency: what market information is available/needed, and how could it be better disseminated (information systems)? Differences in men's and women's access to markets and market information Intra-household decision making on sales (where, when, how many) and control of benefits Are there any aspects of trading that are difficult or socially discouraged for women and poor? How can women owning pigs better participate in, and benefit from markets?	Research NARO Makerere University Supporting actions MAAIF NGOs: Heifer Project International	Increased margins for smallholders in the value chain Sales of pigs with appropriate weight and size according to market demands Organized marketing of pigs at fair prices Pig owners well informed about marketing opportunities Abattoirs operate closer to their full capacity

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
		Supporting actions Analyse the market structure, constraints and opportunities for pigs and pork, covering all agents and actors involved in pig marketing including traders, retailers and consumers Evaluate and test options for coordinating and transporting bulk group sales of animals Assess the performance of different marketing services including provision of market information, facilitation of market linkages, provision of marketing facilities, transport of pigs and pigmeat and identify ways of improving them Identify and respond to demand-driven market opportunities for value addition, through improved product quality Facilitate linkages to market information systems operated by other partners. Gender-disaggregated analysis of market and services access		

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Crosscutting issues	How to organize a pro-poor value chain to considerably increase the output—what are essential components and partnerships?	Researchable issues Impact of value chain development on workloads and on control over the income within the household Who benefits from new technologies in households and communities (equity)? What are incentives for various key actors (farmers, input providers, traders and animal health providers etc.) to invest in pigs? And how can these actors cooperate? Is it feasible to design (a) common model(s) for value chain development through analysis of the lessons learnt from the diverse value chains, in particular comparing the pig value chains in Vietnam? Supporting actions Characterization of complete value chains and production systems in the target locations (own surveys and other studies) at the start Develop indicators of success Capacity building at all stages Compare the approaches applied for the different value chains Develop an easy monitoring system for home consumption of meat	Research NARO Makerere University Supporting actions MAAIF	Contribution of pig production to livelihoods increased considering tangible and intangible benefits

Geographic focus

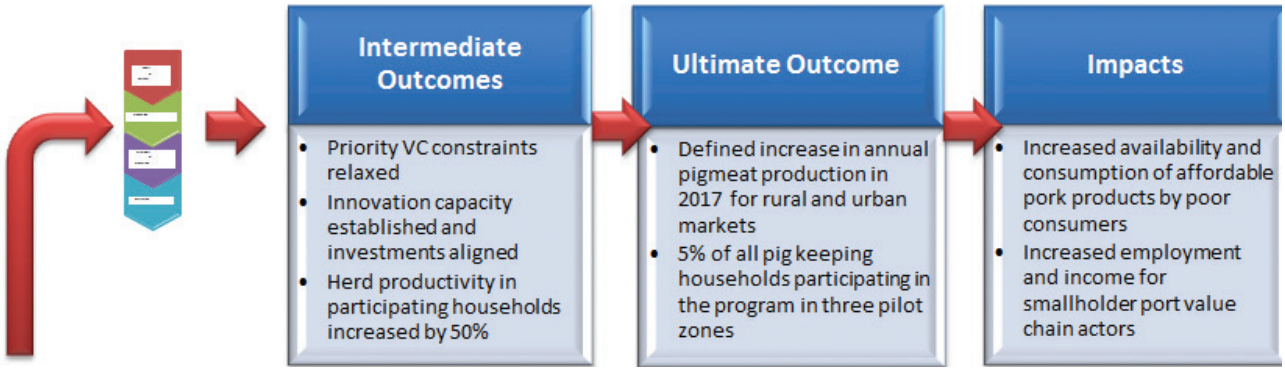
The project will focus initially in the districts with higher smallholder pig concentration ensuring a gradient of market access. Higher density of pig keeping suggests inherent comparative advantage, and facilitates interventions based on creating economies of scale. Three initial zones of focus are proposed:

- Value chains originating in the small-scale semi-intensive production units in Kampala and neighbouring districts
- Those originating in smallholder systems along the corridor between Kampala and Lake Albert
- Those originating in smallholder systems in the Soroti-Mbale area

Focal zones will be confirmed after more in-depth consultation with stakeholders and the initial situational analysis is completed.

Potential for impact

The Livestock Census 2008 revealed that over 1.1 million households keep pigs, representing 17% of all households in Uganda. The vast majority keep pigs in low input-low output free-range systems. Fixing a development target of improving significantly household production by 50% in at least 5 of these households (i.e. 50,000 households) should be achievable if the necessary development investment is mobilized. Because smallholder pig systems are often managed by women (e.g. Pickering et al. 1996), at least half of the beneficiaries should be women. Associated improvements in productivity in input and service delivery and along the value chain can reduce waste and inefficiency and improve quality of the final product, thereby adding value that translates in increased employment and income; specific targets will be set after the initial assessment of the value chain. Increased production and efficiency should contribute to increased availability and access to pork products by poor consumers; more information will be needed about the structure of consumer demand for pork from smallholder systems and how it is differentiated by income group before appropriate targets for increased consumption by poor consumers can be set.



Components	Value chain outcomes
Inputs & Services	Key inputs and services for breeding, feed, and animal health accessible to both male and female smallholders Increased access to information about best management and production practices among male and female smallholders Conducive policy and institutional environment established
Production	Appropriate levels of investment in housing and better management practices Better selection within existing breeds, lower inbreeding index and introduction of improved genetic resources Better on-farm feed options and better use of local feedstuffs in appropriately formulated, locally produced feed rations, with seasonal variation minimized Reduced risk of ASF and reduced incidence of helminths and cysticercosis Improved piglet survival and offtake rates
Transport & Processing	Improved pork safety Reduced transport and transaction costs
Marketing	Lower marketing margins and higher share of price captured by producers, regardless of gender Product and quality branding increases returns to value chain actors Market information more widely available

Summary of indicators along the impact pathway that we believe can achieve these impacts.

Stakeholders in Uganda and their possible role

Stakeholder	Type	Role	Remark
Makerere University Veterinary Sciences Animal Production Agricultural Economics	Public university	Conduct research activities, training	Consulted
East African Dairy Development Project (EADD)	Heifer Project International-led project, ILRI as partner	Share BDS strategies for market development	Consulted
National Agricultural Research Organization (NARO)	Public sector NARS	Implement the field research activities	Consulted
National Livestock Resources Research Institute (NaLIRRI)	Public sector NARS (part of NARO)	Implement lab and field research activities	Consulted
Livestock Development Investment Project	Government project funded by AfDB	Infrastructure development, esp. slaughter slabs	To be consulted
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	Government	Support the field activities in all the project sites	Consulted
Danida	Donor	Fund development intervention and complementary research activities of national partners	To be consulted
Volunteer Efforts for Development Concerns (VEDCO)	NGO	Support implementation of development intervention in smallholder households	To be consulted
Heifer Project International	NGO	Support implementation of development intervention, breeding schemes	To be consulted
SNV (Netherlands NGO)	NGO	Experience sharing on value chain development	To be consulted

Full information on references is included in the Program proposal that can be downloaded from http://cgspace.cgiar.org/handle/10568/3248